SUPERPRESSURE

COMPRESSORS

HAND OPERATED AND MOTOR DRIVEN

| DATE | CHANGE MADE |
|------|-----------------------|
| 6-94 | ADDED AUTOLUBE SYSTEM |

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ADMIN\MANUAL\COMPR-OLD

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FOR HAND OPERATED MODELS:

- 46-13310-2 10,000 PSI SINGLE-END COMPRESSOR
- 46-13315-2 20,000 PSI SINGLE-END COMPRESSOR
- 46-13320-2 10,000 PSI DOUBLE-END COMPRESSOR
- 46-13325-2 20,000 PSI TEO STAGE COMPRESSOR

FOR MOTOR-DRIVEN MODELS:

- 46-13411-2 10,000 PSI SINGLE-END COMPRESSOR
- 46-13416-2 30,000 PSI SINGLE-END COMPRESSOR

46-13421-2 10,000 PSI DOUBLE-END COMPRESSOR

46-13427-2 30,000 PSI TWO STAGE COMPRESSOR

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I. INTRODUCTION

The Superpressure Diaphragm-Type Gas Compressors handle fluids of all types with absolute purity. The fluid being compressed comes into contact only with clean, dry, corrosion-resistant metallic surfaces. The compressors are suited for all types of laboratory applications as well as for pilot plant and industrial applications requiring low gas flows. The compressors operate at a 14 to 1 maximum compression ratio and are designed to circulate or boost gas from a low pressure to pressures of 10,000, 20,000, or 30,000 psi. These compressors may be used for testing and calibration of critical devices such as missile system components, etc., where hydrostatic pressure testing and calibration would be difficult or impossible.

These compressors may be easily cleaned. Fluids other than ordinary oil, such as oxygencompatible fluorinated products, may be used for diaphragm pulsing if required for specific applications. Compressors can be constructed of materials other than those normally supplied for particular corrosionresistant applications on special order. The 6,000 and 10,000 psi compressors when specifically cleaned and services, are also used for oxygen service.

These compressors are adaptable to either gas or intermittent liquid service. Changeover from one to the other is accomplished by interchanging a set of intake and exhaust check valves. Single or double ball check valves are available from Newport Scientific, Inc. which enable the compressors to be used for intermittent liquid service.

The four models of hand-operated diaphragm compressors described herein are as follows:

- 10,000 psi Single-End Compressor, 46-13310-2
- 20,000 psi Single-End Compressor, 46-13315-2
- 10,000 psi Double End Compressor, 46-13320-2
- 20,000 psi Two-Stage Compressor, 46-13325-2

The 10,000 psi single end compressor and 10,000 psi double-end compressor are illustrated in Figure 1-1.

The six models of motor-drive diaphragm compressors described herein are as follows:

- 10,000 psi Single-End Compressor, 46-13411-2
- 30,000 psi Single-End Compressor, 46-13416-2
- 10,000 psi Double-End Compressor, 46-13421-2
- 30,000 psi Two-Stage Compressor, 46-13427-2

The 6,000 psi singl-end compressor and 10,000 psi double-end compressor are illustrated in Figure 1-2.

The following accessories are available for use with these compressors.

- 47-18315 Bourdon Tube Pressure Gauge, 0–15,000 psi.
- 47-18330 Bourdon Tube Pressure Gauge, 0-30,000 psi
- 44-19731 Little Richard Pneumatically Operated Valve, 60,000 psi, normally closed valve.
- 44-19791 Little Richard Pneumatically Operated Valve, 60,000 psi, normally open valve.
- 44-19665 Meter-Mo Pneumatic Proportioning Valve, 60,000 psi, normally closed valve.
- 44-19695 Meter-Mo Pneumatic Proportioning Valve, 60,000 psi, normally open valve.
- 49-14405 Dry-Type Filter, 5 micon.
- 45-11020 Superpressure Tubing, 304 Stainless, ¼ inch O.D.

Also available is a full line of Non-Rotating Stem Valves, Tubing, Fittings, Reaction Vessels, and other accessories.

II. PRINCIPLES OF OPERATION

The plunger of the compression head is reciprocated as in a pump. Oil from the storage bulb is compressed by the plunger, which in turn pulses the diaphragm. The fluid to be compressed is taken in and discharged on the opposite side of the diaphragm through the check valves in the head plate on the down and up stroke of the diaphragm. Oil is drawn into the chamber beneath the diaphragm by the suction created on the plunger backstroke. Excess oil in the chamber can flow back to the storage bulb during the forward plunger stroke through the pressure limiting device. This built-in hydraulic device is manually adjustable and ensures that the discharge pressure of the compressor cannot exceed a preset limit. The plunger stroke is preset so that under normal operating conditions, oil will not flow through the pressure limiting device unless the maximum discharge pressure is exceeded.

> NOTE: Hydraulic Check Valve located at base of Oiler (not shown) Figure 2-1. Cross-Section of Compression Head Assembly

III. PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

CHARACTERISTICS OF THE DIAPHRAGM-TYPE COMPRESSORS:

- Contamination-free gas compression.
- Parts in contact with gas are made of the following materials:
- Upper head plates, 17-4PH SS; Valves, 302, 304, 316, 416, 440C & 17-4PH SS; Diaphragms, 302 SS.
- Compressor is suitable for suction at constant or continually varying suction pressures up to the maximum permissible discharge pressure.
- Compression ratios of up to 14-to-1 are obtainable for each stage.
- Diaphragm life in excess of 500 hours of operation normally attained.
- Absence of stuffing box permits leak-free operation.
- Elastomer packing provides a leak-free oil seal, long life and never needs tightening.
- Interchangeable check valves permit either continuous gas or intermittent liquid service.
- Check valves can be easily removed for cleaning and replacement.
- Floating hydraulic plunger ensures minimum wear on packing.

SPECIFICATIONS: Specifications for hand-operated diaphragm compressors are given in Table 3-1 and for motor-driven diaphragm compressors in Table 3-2. All compressor intake and discharge check valve openings (female) are for ¹/₄ inch O.D. Superpressure tubing.

CAPACITY CURVES: Capacity curves for hand-operated compressors are shown in Figure 3-1 and for motor-driven compressors in Figure 3-2. Capacities for Double-End units are approximately double those of the Single-End units with the same pressure rating.

| | SINC | LE END | DOUBLE END | TWO STAGE |
|--|-----------------------|-----------------------------|--------------------------|-------------------------|
| CATALOG NUMBER | 46-13310-2 | 46-13315-2 | 46-13320-2 | 46-13325-2 |
| MAXIMUM WORKING PRESSURE (PSI) | 10,000 | 20,000 | 10,000 | 20,000 |
| MINIMUM SUCTION PRESSURE (PSI) | 150 | 150 | 150 | 50 |
| PLUNGER DIA. (IN.) | 9/16 | 3/8 | 9/16 | 9/16, 3/8 |
| STROKE, NOMINAL (IN.) | 1.0 | 1.0 | 1.0 | 1.0 |
| VOLUME DISPLACED AT ATMOS. PRESSURE (CU. IN./STROKE) | .25 | .11 | .50 | .25 |
| WEIGHT (LB.) NET SHIPPING | 60/80 | 103/123 | 76/96 | 118/138 |
| OVERALL DIMENSIONS L X W X H | 10 X | 20 X13.5 | 10 X 2 | 8 X 13.5 |
| MOUNTING DATA | 4 HOLES, 5 X 17-3/ | 11/16 DIA. ON /4 CENTERS | 4 HOLES, 1 5 X 26-1/8 | I/16 DIA. ON CENTERS |
| HANDLE LENGTH (IN.) | | | 40 | |
| PORTS, WORKING FLUID INLET; OUTLET | | ¹ ⁄4 O.D. tub | ing; ¼ O.D. tubing | |

TABLE 3-1. HAND-OPERATED DIAPHRAGM COMPRESSOR SPECIFICATIONS

TABLE 3-2. MOTOR-DRIVEN DIAPHRAGM COMPRESSOR SPECIFICATIONS

| | | SINGLE-EN | D | DOUBLE- | END | TWO STAGE |
|--|----------|-------------|------------------------|--------------------------------|------------------|-------------|
| CATALOG NUMBER | 46-13484 | 46-13411-2 | 46-13416-2 | 46-13487 | 46-13421-2 | 46-13427-2 |
| MAXIMUM WORKING PRESSURE (PSI) | 6,000 | 10,000 | 30,000 | 6,000 | 10,000 | 30,000 |
| MINIMUM WORKING PRESSURE (PSI) | 150 | 150 | 150 | 150 | 150 | 50 |
| PLUNGER DIA. (IN. | 3/4 | 9/16 | 3/8 | 3/4 | 9/16 | 9/16, 3/8 |
| STROKE, NOMINAL (IN.) | 7/8 | 1-1/16 | 7/8 | 7/8 | 1-1/16 | 1-1/16 |
| STROKES PER MINUTE | 58 | 58 | 58 | 58 | 58 | 58 |
| WOLUME DISPLAYED AT ATMOS. PRESSURE (XU. IN./STROKE) | .36 | .26 | .10 | .72 | .52 | .26 |
| WEIGHT (LB.) NET/SHIPPING | 245/295 | 238/289 | 254/305 | 285/335 | 270/320 | 286/327 |
| OVERALL DIMENSIONS L X W X H (IN.) | | 20 X 22 X 1 | 9 | | 29 X 22 X 1 | 9 |
| MOUNTING DATA | | 4 HOL | ES, 9/16 DI | A. ON 13 X 14-1 | /4 CENTER | ls |
| MOTOR CHARACTERISTICS | 1 HP, 1 | 800 RPM, 23 | 30/460 VOL W/58 RPN | T, 3 PHASE, 60 M SPEED REDU | HZ, EXPLC CER | SION PROOF, |
| PORTS, WORKING FLUID INLET; OUTLET | | | ¼ O.D. TUE | BING; ¼ O.D. TU | JBING | |

IV. INSTALLATION

Installation requirements, installation procedures, and checkout procedures are contained in this section.

ELECTRICAL REQUIREMENTS

Hand-operated compressors do NOT require ANY electrical connections.

Motors for the motor-driven compressors require 208-220 or 440V, 3-phase, 60 Hz power. This power must be connected by an electrician in accordance with local and national electrical code regulations. Observe the directions provided on the instruction plate attached to the motor.

SPACE REQUIREMENTS

These compressors require the following minimum area:

| <u>Catalog No.</u> | Mounting Area |
|--------------------|---|
| | <u>(L x W)</u> |
| 46-13310-2 | 20 x 10 inches |
| 46-13315-2 | 20 x 10 inches |
| 46-13320-2 | 29 x 10 inches |
| 46-13325-2 | 29 x 10 inches |
| 46-13411-2 | 20×24 inches |
| 46-13416-2 | 20 x 24 inches |
| 46-13421-2 | 18 x 31 inches |
| 46-13427-2 | 18 x 31 inches |
| | Catalog No. 46-13310-2 46-13315-2 46-13320-2 46-13325-2 46-13411-2 46-13416-2 46-13421-2 46-13427-2 |

GAS/LIQUID SERVICE CONVERSION

These compressors can be adapted for intermittent liquid service. To convert from gas to intermittent liquid service or vice-versa, replace the set of intake and exhaust check valves on the compressors with the set specified in Table 4-1 for the particular service application. On the 10,000 psi gas head, for intermittent service with normal liquids, double-ball check valves must be used. Difficult liquids are water, volatile hydrocarbons, low or high-viscosity liquids and liquids containing sediments. On 20,000 and 30,000 psi gas heads, for intermittent liquid service, double-ball check valves must be used for all liquids.

PRECAUTION

Liquid service check valves CANNOT be used on 46-13325-2 or 46-13427-2 Two-Stage Compressors. These Compressors are <u>NOT</u> adaptable to liquid service.

| | | | | | (|
|-------------|--------|---------------------------------------|-----------------|-----------------|-----------------|
| COMPRESSOR | QTY. | STANDARD GAS | LIQUID SERVICE | LIQUID SERVICE | OXYGEN |
| CATALOG | | CHECK VALVES | SINGLE BALL | DOUBLE BALL | SERVICE* |
| NUMBER | | INLET/DISCHARGE | INLET/DISCHARGE | INLET/DISCHARGE | INLET/DISCHARGE |
| 10,000 PSI, | 1 | | 1 | 1 | 1 1 |
| SINGLE | 1 EACH | 44-11102/ | 44-14100/ | 44-14210/ | 44-11100/ |
| END, | | 4-11107 | 44-14115 | 44-14215 | 44-11105 |
| 46-13310-2 | | 1 | 1 | 1 1 | |
| 46-13411-2 | | | ! | | |
| 10,000 PSI, | | | | / | |
| DOUBLE | 2 EACH | 44-11102/ | 44-14100/ | 44-14210/ | 44-11100/ |
| END, | | 44-11107 | 44-14115 | 44-14215 | 44-11105 |
| 46-13320-2 | | 1 | 1 | 1 | |
| 46-13421-2 | | | | | |
| 20,000 & | | | | | |
| 30,000 PSI, | 1 EACH | 44-13100/ | 1 | 44-13140/ | |
| SINGLE | | 44-13120 | , | 44-13160 | |
| END, | | | | ! | |
| 46-13315-2 | | | | | |
| 46-13415-2 | | | | i i | |
| 46-14136-2 | | · · · · · · · · · · · · · · · · · · · | | | |
| 30,000 PSI, | | 44-11102/ | | | |
| TWO | 1 EACH | 44-11107 | | | |
| STAGE, | l | 44 12100/ | | | |
| 46-13325-2 | | 44-13100/ | | | |
| 46-13427-2 | | 4413120 | | 1 | |

TABLE 4-1 ORDERING DATA AND SPECIFICATIONS FOR CHECK VALVES

*Also used where ultra-pure cleaning is required.

Each check valve listed in Table 4-1 has a ¹/₄ inch O.D. female tubing opening. A 45-16705 Special-Inlet Adapter for liquid service can be used with the 44-13140, 44-14100, and 44-14210 Intake Check Valves when a ¹/₄ inch NPT connection is desired. This adapter converts the ¹/₄ inch O.D. female connection to ¹/₄ inch NPT, female.

OXYGEN SERVICE CONVERSION

The 10,000 psi compressor can be modified for Oxygen Service. This involves Oxygen-cleaning all parts in contact with the gas, installing a set of Oxygen-service check valves, and replacing the packing. Contact Newport Scientific for details.

INSTALLATION PROCEDURE

Perform the following procedures to install your compressor:

- 1. Remove cork seal from reservoir. Remove plastic plugs from the intake and exhaust check valves.
- 2. Secure compressor through mounting holes. Mounting dimensions are specified in Table 3-1 for Hand-Operated Compressors and Table 3-2 for Motor-Driven Compressors.
- 3. Fill oil reservoir with SAE 10W30 (or similar) oil, except for oxygen service compressors. Fill oxygen service compressor's oil reservoir with fluorocarbon oil or halocarbon oil.
- 4. Connect inlet tubing to compressor as follows: When installing or removing tubing, keep all tubing lines and fittings clean. Flush tubing with solvent using a syringe and blow dry with clean air or gas. (Including new tubing.)

PRECAUTION

If dirt enters compressor, the diaphragm and check valves may be damaged.

- A. Install a 5 micron dry-type filter (49-14405) in the inlet tubing line.
- B. Connect inlet tubing line from filter as follows:

-For the single end or two-stage compressor, connect 45-11020 tubing to check valve marked IN on the head.

-For the double-end compressor, connect to the inlet manifold.

5. Connect outlet tubing from Discharge check value to a pressure relief value or rupture-disc assembly in accordance with standard ASME practice.

PRECAUTION

A relief valve or rupture-disc must be installed to prevent damage to equipment if an overpressure condition occurs.

Connect outlet tubing from relief valve or rupture disc to system equipment.

6. For hand-operated compressors, install handle and insert locking pin.

7. For motor-driven compressors, connect power line to motor in accordance with local and national electrical code regulations. Observe the power requirements and directions provided on the instruction plate attached to the motor. A switch or circuit breaker should be connected in the power line to enable turning the compressor on and off, as required.

WARNING

IMPROPER WIRING CONNECTIONS COULD PRESENT A SHOCK HAZARD.

8. If necessary, adjust the crank stroke length. The crank length was preset by NEWPORT SCIENTIFIC, INC. and will require readjustment only if:

-the shoe clamping bolts work loose or are intentionally loosened. -the head assembly is changed.

To adjust the crank stroke length, perform the "<u>Crank Stroke Adjustment Procedure</u>" in Section VII, Maintenance.

9. Checkout the operation of the compressor by performing the procedure in Section V, Operation.

PRECAUTION

<u>Do not run the compressor with no suction pressure, or very low suction pressure</u>, this will cause a build up of oil underneath the diaphragm and will result in the compressor ceasing to pump gas. If this does occur, turn on the gas suction, loosen the lock nut on the pressure limiting device (be sure not to lose the original setting), back off the set screw, and run the compressor to allow the excess oil to re-circulate. The limiter should then be returned to its original setting.

V. OPERATION

The operating procedures in this section describe how to operate the compressor, how to perform the priming procedure if the compressor fails to build-up pressure, and how to verify proper check valve operation.

PRECAUTION

If dirt enters the compressor, the diaphragm and check valves may be damaged. It is absolutely essential that the incoming gas is filtered. We suggest a 5 or 10 micron in-line Filter such as Cat. # 49-14405.

Also any lines to be placed between the Filter and the compressor should be thoroughly cleaned. Flush with solvent using a syringe, and blow dry with clean air or gas. (Even a new piece of high pressure tubing may contain sufficient particulate matter to foul the check valves).

HAND-OPERATED DIAPHRAGM COMPRESSOR

The hand-operated compressor is operated by manually moving the handle back and forth. If the compressor fails to build-up pressure, discontinue operations and perform the "Priming Procedure" in this section.

MOTOR-DRIVEN DIAPHRAGM COMPRESSOR

To operate the motor-driven compressor, turn on electric power to the compressor. Observe the gas discharge pressure to ensure that the compressor is operating properly. If the compressor fails to build-up pressure, shut off power and perform the "Priming Procedure" in the next paragraph.

PRIMING PROCEDURE

To prime the compressor, perform the following:

- 1. Close off the gas discharge line.
- 2. Apply suction pressure to the compressor inlet. (The term suction pressure means the positive pressure applied to the compressor inlet, e.g. a minimum suction pressure of 700 psi is recommended for 10,000 psi discharge on 46-13411-2).

- 3. Add oil to the reservoir if required.
- 4. Referring to Figure 5-1, loosen the stop nut on the top of pressure limiting device, being careful not to lose the setting. Reverse the set screw back until it no longer applies tension to the spring. The stop nut will turn with the set screw, thereby maintaining the original Factory setting.
- 5. Run the compressor. While it is running, loosen the large gland nut at the base of the pressure limiting device by 1-1/2 turns, and pull back on the body of the limiter to release the orifice piece (Item 27, Page 7-36). This removes all force from the seat and allows fresh oil to be pulled in from the reservoir.

The large gland nut should be loosened just for a couple of strokes of the compressor and then retightened. Some oil will be spilled out during the above operation.

6. Return the setscrew to its' original setting and retighten the stop nut.

PROCEDURE FOR VERIFYING PROPER CHECK VALVE OPERATION

This system is designed to automatically lube the drive mechanism. It will provide the right amount of grease to meet lubrication requirements for the Slotted Lever.

This unit should be checked every 3-5 hours of run time on the compressor to determine grease level. To refill Lube Site: Remove fasteners and guard from compressor. Simply refill by attaching the grease gun that is supplied with the unit to the grease fitting. Fill until the seal ring rises to the bottom edge of the "CAUTION" label. **DO NOT OVERFILL.** This should be done before the seal ring is down to the top of the base.

Also, when service is being done on the Lube Site, the pivot pins on the drive unit should be oiled with any 10W 30W or 10W 40W oil.

These instructions will allow the Lube Site to give you many years of trouble-free automatic lubrication.

VI. WARNINGS, PRECAUTIONS, AND LIMITATIONS

This section summarizes all warnings, precautions, and limitations contained in this manual. The warnings paragraphs list hazards which, if not observed, could lead to personnel injury. The precautions paragraph lists actions which could result in damage to the equipment.

WARNINGS

The power line ground circuit for the motor-driven compressor should be continuous to the main power panel. The panel should be grounded directly to a water pipe or other electrical earth ground. Improper grounding could result in a shock hazard.

When performing maintenance on a motor-driven compressor, disconnect power from compressor and attach a warning label ("DO NOT TURN ON SWITCH, MAINTENANCE BEING PERFORMED") to the power switch to ensure against inadvertent start-up of the compressor.

PRECAUTIONS

Liquid service check valves CANNOT be used on 46-13325-2 or 46-13427-2 Two-Stage Compressors.

A relief valve or rupture-disc must be installed in the outlet tubing line to prevent damage to equipment if an overpressure condition occurs.

Ensure that the fluid being compressed is maintained free of solid particulate contaminates. If dirt enters the compressor, the diaphragm and check valves may be damaged.

LIMITATIONS

The pressure-limiting device should be set to an upper limit pressure of approximately 110 percent of the maximum operating pressure.

The pressure limiter on the first stage of a two-stage compressor should be set at 5000 psi and the inter-stage pressure should not exceed 4500 psi for optimum diaphragm life.

VII. MAINTENANCE

Periodic maintenance, adjustment procedures, troubleshooting information, corrective maintenance procedures, spare parts list and illustrated parts lists are contained in this section.

PERIODIC MAINTENANCE

Periodic maintenance consists of lubricating the compressor and replacing the filter discs in the filter in the inlet tubing line.

A. Lubrication

On the hand-operated and motor-driven compressors, every eight (8) hours of operating time apply a few drops of any 10W30 or 10W40 oil to the three (3) pivot pins of the drive piston assembly.

On motor-driven units, for every eight (8) hours of operating time grease the roller bearing and slotted lever through the crank pin grease fitting with a Molybdenum type grease as supplied with the unit.

B. Filter Replacement

If a 49-14405 dry-type filter is installed in the inlet tubing line, periodically replace the filter discs (49-14490, set of four).

ADJUSTMENT OF PRESSURE LIMITING DEVICE

NOTE: The Pressure Limiting Device was preset by Newport Scientific and should never need readjustment. This device was set to release oil back to the storage bulb when the discharge pressure reaches 110% of the maximum pressure rating of the compressor. This setting was obtained by turning the setscrew at the top of the pressure limiter until the desired release pressure was obtained.

The setscrew was then held stationary while the outer stop nut was tightened down to the limiter body to lock in the setting. As long as the stop nut is not turned relative to the setscrew, the setscrew can be turned out and in for priming and still maintain the original factory setting.

If the stop nut has been turned relative to the setscrew, the following procedure can be followed to reproduce the original setting.

- 1. Install pressure gauges in the inlet & outlet lines of the compressor if not already present.
- 2. Make sure system is primed by performing the <u>Priming Procedure in Section V.</u>
- 3. Make sure check valves are operating properly according to the <u>Procedure for Verifying Proper</u> <u>Check Valve Operation in Section V.</u>
- 4. Stop compressor operation.
- 5. Loosen outer stop nut on top of pressure limiter and turn setscrew back until all tension is removed from the spring.
- 6. Apply suction pressure of at least 1000 psi.
- 7. Adjust setscrew slowly inward to obtain the following maximum discharge pressure.

-for 10,000 psi compressors, set to 11,000 psi -for 20,000 psi compressor, set to 22,000 psi -for 30,000 psi compressor, set to 33,000 psi

- **NOTE:** For a two stage compressor, set to 5,000 psi on first stage.
- **NOTE:** Outlet pressure gauge needle will fluctuate slightly with each piston stroke, using the highest reading on each stroke when setting the pressure.
- 8. Hold setscrew stationary and tighten outer stop nut to lock in pressure setting.
- **NOTE:** It is not recommended that the pressure limiter be set at a pressure lower than the original factory setting. If it is desired to maintain the system at a lower pressure, to prevent over-pressurization of components, the following configuration is recommended.

CRANK STROKE ADJUSTMENT PROCEDURE

On Motor-Driven Compressors, the piston stroke length is preset by Newport Scientific and must be re-adjusted if:

- The slide block clamping bolts work loose or are intentionally loosened.

- The head assembly or packing are changed.

NOTE: The pressure limiter adjustment need not be changed unless the original factory setting was lost according to the last section on <u>Adjustment of the Pressure Limiting Device</u>. If the pressure limiter <u>and</u> the crank stroke both need adjustment, they must be performed simultaneously according to paragraph 11) of this section.

For maximum compressor efficiency, the volume of oil displaced is critical. This volume is proportional to the length of the piston stroke, and the adjustment procedure is the same for all compressors and all piston sizes -

-10,000 psi compressor, 9/16" diameter piston(s) -20,000 & 30,000 psi two stage compressors; first stage, 9/16" diameter piston second stage, 3/8" diameter piston

1. Stop compressor operation.

Disconnect power and attach a warning label ("DO NOT TURN ON SWITCH, MAINTENANCE BEING PERFORMED") to the power switch to assure against inadvertent start-up of the compressor.

- 2. Remove guard.
- 3. Crack tubing gland nut on discharge check valve(s) to release system pressure. Re-tighten gland nut (s).
- 4. Bring crank to the vertical position (shown in Figure 7-2) as follows. Rotate the motor armature by inserting a metal rod through the cooling slots in the rear of the motor and carefully turning the fan blades until crank is in the vertical position.
- 5. Loosen the two (2) slide block clamping bolts on the crank.
- 6. While crank is in vertical position, adjust the dimension A, (see Figure 7-1) distance between the bottom of the slot in the crank and the end of the slide block to approximately 7/16 inch. (Figure 7-2 shows the crank at minimum and maximum stroke positions) tighten the two (2) slide block clamping bolts to 50-60 ft-lbs torque.

- 7. Place a piece of masking tape on the slotted lever beside the slide block and mark the position of the slide block with a pencil.
- 8. Apply suction pressure of at least 1000 psi.
- 9. Operate the compressor with the discharge dead-ended on a pressure gauge.
- 10. Make sure compressor is primed and that check valves are operating properly according to Section V.
- 11. The slide block adjustment "A" of 7/16 inch was deliberately set in the high range to cause over stroking of the compressor. Over stroking is present when the oil level in the oil reservoir rises and falls before 110% of the maximum pressure is reached. While compressor is over stroking, pressure should build up to 110% of the maximum operating pressure.

| Maximum Operating Pressure | <u>110%</u> |
|----------------------------|-------------|
| 10,000 psi | 11,000 psi |
| 20,000 psi | 22,000 psi |
| 30,000 psi | 33,000 psi |

NOTE: The pressure limiter on the first stage of a two-stage compressor should be set at 5,000 psi and the interstage pressure should not exceed 4500 psi for optimum diaphragm life.

If the pressure obtained is lower or higher than that shown above, then adjust the pressure limiter according to the <u>Adjustment of Pressure Limiting Device</u> earlier in this section.

- 12. With pressure limiter set at proper pressure, adjust the crank dimension "A" to obtain optimum stroke. Optimum stroke is obtained when oil level just begins to rise and fall as 110% of maximum pressure is reached.
- 13. Stop compressor operation.
- 14. Bring crank to vertical position and loosen bolts according to steps 3, 4, and 5.
- 15. Adjust slide block downward in increments of 1/32 inch from the last setting and tighten bolts to 50-60 ft-lb. Mark new position of slide block.
- 16. Operate the compressor.
- 17. Check for over stroking according to step 11. If compressor is still over stroking, repeat steps 13 through 17 until optimum stroke is achieved.
- **NOTE:** Compressor is under stroking when pressure fails to build up to 110% of the maximum pressure.
- 18. Replace guard.

TROUBLESHOOTING

Refer to Table 7-1 for guidelines in localizing a compressor malfunction. Refer to "Corrective Maintenance" procedure to replace a component.

| Malfunction Indication | Probable Cause | Action |
|---------------------------------|---|--|
| COMPRESSOR OPERATES AND | 1.External leakage at check valve or | 1.Check for leakage using bubble test. |
| BUILDS-UP PRESSURE BUT | diaphragm. | Tighten or replace component as req'd. |
| OUTPUT VOLUME IS IMPROPER | 2 Pressure limiting device setting is too | 2 Perform "Adjustment of Pressure |
| | low. Oil level in reservoir changes | Limiting Device" procedure in Section |
| | more than a little on each stroke. | VII Maintenance. Pressure limiting |
| | | device should never heat. |
| | 3 Intake or exhaust check value | 3 Perform the "Procedure for Verifying |
| | malfunctioning. | Proper Check Valve Operation" in |
| | 5 | Section V, Operation. |
| COMPRESSOR OPERATES BUT | 1.Inlet Pressure too low. | 1.Check that compression ratio is 14:1 |
| TO MAXIMUM | | maximum. |
| | 2. Pressure leakage. | 2. Isolate compressor from rest of |
| | e e e e e e e e e e e e e e e e e e e | system and check for pressure leaks. |
| | 2 Eaulta abook walna | 2 Derforme "Desse hurs for Verificing |
| | 5. rauity cneck valve. | Proper Check Valve Operation" in |
| | | Section V, Operation. |
| | | |
| : | 4.Compressor is not primed. | 4.Perform "Priming Procedure" in |
| | | Section V, Operation. |
| | 5.Defective hydraulic check valve or | 5.Replace. |
| | pressure-limiting device. | - |
| BUBBLES IN OIL RESERVOIR | 1.Leaking packing. | 1.Replace packing according to |
| | | VII Maintenance |
| | | - 1, |
| | 2.Ruptured Diaphragm(s) | 2.Replace diaphragm(s) according to |
| | | "Corrective Maintenance" in Section |

TABLE 7.1. COMPRESSOR TROUBLESHOOTING

CORRECTIVE MAINTENANCE

The following paragraphs describe how to replace the check valves, the diaphragm, the packing and the pressure-limiting device.

WARNING

ON MOTOR-DRIVEN COMPRESSORS, DISCONNECT POWER FROM COMPRESSOR AND ATTACH A WARNING LABEL ("DO NOT TURN ON SWITCH, MAINTENANCE BEING PERFORMED") TO THE POWER SWITCH TO ENSURE AGAINST INADVERTENT START-UP OF THE COMPRESSOR.

Check Valve Replacement

- 1. Stop compressor operation.
- 2. Release pressure from tubing lines.
- 3. Disconnect tubing connected to check valve.
- 4. Remove check valve.
- 5. Examine check valve for foreign particles, wear or damage. Replace with new check valve, if required.
- 6. Install check valve on compressor. Ensure that the lens rings are properly seated. Improper seating of the lens rings may result in a leaking check valve.

Diaphragm Replacement

- 1. Stop compressor operation.
- 2. Release pressure from system and tubing lines to compressor.
- 3. Close off intake and discharge lines.
- 4. Crack connection to check valves to allow trapped pressurized fluid to escape, then disconnect all gas lines.
- 5. Support head and remove the four (4) caps screws which secure it to the frame.
- 6. Pull head straight back, being careful not to scratch the piston which will remain connected to the drive assembly.

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- 7. Secure hydraulic section in a clamping device.
- 8. Remove head bolts and pull the head plate. Inspect the head for damage. Clean head and cover with a protective cloth.
- 9. Remove the check valves, inspect, clean and cover with a protective cloth.
- 10. Remove diaphragm. The 10,000 psi compressor head has one (1) diaphragm per head. The 20,000 and 30,000 psi compressor heads have two (2) diaphragms per head.
- 11. Thoroughly clean new diaphragm(s).
- 12. Install new diaphragm(s).
- 13. Reinstall head, head bolts, and check valves. Lubricate head's washer and bolt threads with bearing grease when compressor is used for normal fluids. When used for oxygen service, use fluorocarbon grease. Reinstall all tubing removed (use check valves as guide for proper tubing installation).
- 14. Hand-tighten all the head bolts, using a torque wrench. Sequentially tighten OPPOSING head bolts in 10 ft-lb increments to a final torque of:

-150 ft-lbs for 10,000 psi compressor heads -350 ft-lbs for 20,000 psi and 30,000 compressor heads

- 15. Attach all gas connections.
- 16. Perform the "Priming Procedure" in Section V, Operation.

Packing Replacement

- 1. Perform Steps 1 through 9 of Diaphragm Replacement (above).
- 2. Remove packing and clean packing cavity.
- 3. Replace worn packing components according to the spare parts list on page 7-11.
- 4. Perform steps 13 through 16 of diaphragm replacement.

Pressure-Limiting Device Replacement

- 1. Stop compressor operation.
- 2. Release pressure from system and tubing lines to compressor.
- 3. Crack connection at bottom of pressure-limiting device to allow trapped pressurized fluid to escape.
- 4. Hold body of pressure-limiting device with one (1) wrench while unscrewing gland nut with another wrench, Figure 5-1.
- 5. Unscrew orifice (B10-62006-1, -2, or -4, according to Figure 7-14N, item #27) by wrenching at the flats or the seat.
- 6. Replace the pressure limiting device (C12-62006-1 or C12-62006-2) or parts, as required.
- 7. Reassemble and reinstall on compressor.

<u>SPARE PARTS LIST</u> Table 7-2 lists the spare parts recommended for each compressor. Refer to Figure 2-1 for diagram of spare parts.

| DESCRIPTION | CAT. NO. | HAN | ND-OPER | ATED CO | MPRESS | ORS | MO | TOR-DRI | VEN COI | MPRESSO | DRS |
|-----------------------------------|---------------|----------------|----------------|----------------|----------------|---|----------------|----------------|----------------|---------|---|
| | OK DET NO | Į | 7 | 74 | y v | 46 | AK | ΥK | ٩K | ΨV | 46 |
| | PAKI NU. | 40- 13310-2 | 40- 13315-2 | 40- 13320-2 | 40- 13325-2 | 40- 13325-2 2 nd Stage | 40- 13411-2 | +0- 13416-2 | 40- 13421-2 | 13427-2 | 40- 13427-2 2 nd Stage |
| CHECK VALVE, HYDRAULIC | 44-14110 | | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| CHECK VALVE, HYDRAULIC | 44-11102 | 1 | | 2 | 1 | | 1 | | 2 | 1 | |
| CHECK VALVE, DISCHARGE | 44-11107 | 1 | | 2 | 1 | | 1 | | 2 | 1 | |
| CHECK VALVE, INTAKE | 44-13100 | | 1 | | | 1 | | 1 | | | 1 |
| CHECK VALVE, DISCHARGE | 44-13120 | | 1 | | 1 | | 1 | 1 | | | 1 |
| DIAPHRAGM | 62018000500 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| DIAPHRAGM | 84001001100 | | | | | | | | | | |
| OILER | P1004002900 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| SOFTGOOD PACKING KIT | 85001000900 | 11 | | 2 | Ħ | | 1 | | 2 | 1 | |
| SOFTGOOD PACKING KIT | 85001000500 | | 1 | | | 1 | | I | | | 1 |
| SOFTGOOD PACKING KIT | 85001001100 | | | | | | | | | | |
| PACKING RETAINER | 64042002500 | 1 | | 2 | 1 | | 1 | | 2 | 1 | |
| PACKING RETAINER | 65013002700 | | 1 | | | 1 | | 1 | | | 1 |
| PACKING RETAINER | 84001000800 | | | | | | | | | | |
| PACKING FOLLOWER | 64042002200 | 1 | | 2 | 1 | | 1 | | 2 | 1 | |
| PACKING FOLLOWER | 65013002800 | | 1 | | | 1 | | 1 | | | |
| PACKING FOLLOWER | 84001000700 | | | | | | | | | | |
| NOTES: 1. F | or Check Valv | re parts, re | ter to Figu | tre 7-14. | 1) Back-III | Rino an | d one (1) 1 | Flastomer | Rino | | |

TARLE 7-2. RECOMMENDED SPARE PARTS LIST

i ni

Soligoou kit consists of one (1) O-Kung, one (1) Dack-up Kung, and one (1) Elastonici Kung. Compressors using Fluorocarbon or Halocarbon lubricants (for Oxygen or Ultra-Pure service) require Softgood kit, contact Newport Scientific, Inc. for details. 7-11 kit, contact Newport Scientific, Inc. for details.

PARTS LIST

compressor indicate which assemblies are used on that compressor. The first bullet is for the complete assembly and the other bullets Table 7-3 can be used to locate the figures which illustrate your particular compressor. Bullets in the column for a particular are for the Head assembly(s) and Drive assembly. The latter assemblies are listed for reference only as they are called out in the complete assembly.

Each figure contains circled item numbers which refer to a parts list on the facing page. Use the parts list which corresponds to your compressor's catalog number. These parts lists contain all the information needed to order the part from Newport Scientific, Inc.

| DESCRIPTION | FIGURE | HAND | -OPERATEI | COMPRES | SSORS | OW | TOR-DRIV | EN COMPRE | SSORS |
|------------------------------|--------|------------|------------|------------|------------|------------|------------|------------|------------|
| OF ASSEMBLY | NUMBER | | | | | | | | |
| DRAWING | | 46-13310-2 | 46-13315-2 | 46-13320-2 | 46-13325-2 | 46-13411-2 | 46-13416-2 | 46-13421-2 | 46-13427-2 |
| | | | | | | | | | |
| HAND | 7-3 | • | • | | | | _ | | |
| OPERATED, SINGLE END. ALL | | | | | | | | | |
| HAND-OPERATED, | 7-4 | | | • | • | | | | |
| DOUBLE END & | | | | | | | | | |
| TWO STAGE | | | | | | | | | |
| MOTOR-DRIVEN, | 7-5 | | | | | • | • | | • |
| SINGLE END, ALL | | | | | | | | | |
| MOTOR-DRIVEN, | 7-6 | | | | | | | • | |
| DOUBLE END & | | | | | | | | | |
| TWO STAGE, ALL | | | | | | | | | |
| HEAD ASSEMBLY, | L-L | • | | • | • | • | | • | • |
| 10,000 PSI | | | | | | | | | |
| HEAD ASSEMBLY, | 7-8 | | ٠ | | | | • | | • |
| 20,000 & 30,000 PSI | | | | | | | | | |
| DRIVE ASSEMBLY, | 6-2 | • | • | | | | | | |
| HAND OPERATED, | | | | | | | | | |
| SINGLE END | | | | | | | | | |
| DRIVE ASSEMBLY, | 7-10 | | | • | • | | | | |
| HAND UPEKALED, | | | | | | | | | |
| TWO STAGE | | | | | | | | | |
| DRIVE ASSEMBLY, | 7-11 | | | | | • | • | | |
| MOTOR DRIVE, | | | | | | | | | |
| SINGLE END | | | | | | | | | |
| DRIVE ASSEMBLY, | 7-12 | | | | | | | • | • |
| MOTOR-DRIVEN, | | | | | | | | | |
| DOUBLE END & | | | | | | | _ | | |
| INCOLOR | | | | | | | | | |

TABLE 7-3 I IST OF COMPRESSOD ASSEMBLY DRAWINGS

| | 46-13310-2, HAND-OPERATED 10,000 PSI SINGLE END | | | | | | |
|-------------|---|---------------|---|--------------|--|--|--|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL | | | |
| 1 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per assembly | | | |
| 2 | 4 | 63167001200 | Washer, flat 5/16 I.D. x 1/2 O.D. x .042 | Steel | | | |
| 3 | 4 | Q4650023530 | Screw, 5/16-18UNC-2a x 1-1/4, soc. head cap | Steel | | | |
| 4 | 1 | See Fig. 7-10 | Drive Assembly, Hand Op. Single End | Per Assembly | | | |
| 5 | 4 | 63167001300 | Washer, flat 3/8 I.D. x 9/16 O.D. x .031 | Steel | | | |
| 6 | 4 | Q4650023934 | Screw, 3/8-16UNC-2A x 1-1/2, soc. head cap | Steel | | | |
| 7 | 4 | R1065006800 | Washer, flat plain, 3/8 I.D. x 1/16 | Steel | | | |
| 8 | 4 | R1052020300 | Nut, 3/8-16UNC-2B, hex | Steel | | | |
| 9 | 1 | 64100000400 | Base | Steel | | | |
| | | 46-13315-2 | , HAND-OPERATED 20,000 PSI SINGLE END | | | | |
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL | | | |
| 1 | 1 | See Fig. 7-9 | Head Assembly, 20,000 psi | Per assembly | | | |
| 2 | 4 | 63176001200 | Washer, flat 5/16 I.D. x ½ O.D. x .042 | Steel | | | |
| 3 | 4 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel | | | |
| 4 | 1 | See Fig. 7-10 | Drive Assembly, Hand Op. Double End | Per Assembly | | | |
| 5 | 4 | 63167001300 | Washer, flat 3/8 I.D. x 9/16 O.D. x .031 | Steel | | | |
| 6 | 4 | Q4650023938 | Screw 3/8-16UNC-2A x 1-3/4, soc. head cap | Steel | | | |
| 7 | 4 | R1065006800 | Washer, flat plain, 3/8 I.D. x 1/16 | Steel | | | |
| 8 | 4 | R1052020300 | Nut, 3/8-16UNC-2B, hex | Steel | | | |
| 9 | 1 | 64100000400 | Base | Steel | | | |

| 46-13320-2, HAND-OPERATED 10,000 PSI DOUBLE END | | | | |
|---|------|-----------------------|--|---------------|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per assembly |
| 2 | 8 | 63167001200 | Washer, flat 5/16 I.D. x 1/2 O.D. x .042 | Steel |
| 3 | 8 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel |
| 4 | 1 | See Fig. 7-10 | Drive Assembly, Hand Op. Double End | Per assembly |
| 5 | 8 | 63167001300 | Washer, flat 3/8 I.D. x 9/16 O.D. x .031 | Steel |
| 6 | 8 | Q4650023934 | Screw, 3/8-16UNC-2A x 1-1/2, soc. head cap. | Steel |
| 7 | 8 | R1065006800 | Washer, flat plain, 3/8 I.D. x 1/16 | Steel |
| 8 | 8 | R1052020300 | Nut, 3/8-16UNC-2B, hex | Steel |
| 9 | 1 | 65010000200 | Base | Steel |
| 10 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per Assembly |
| 11 | 2 | 45-14311 | Tee, ¼ inch Tubing | 316 St. Steel |
| 12 | 4 | 64042001800 | Tubing, ¼ inch Jumper | 304 St. Steel |
| ····· | | <u>46-13325-2, HA</u> | ND-OPERATED 20,000 PSI TWO STAGE | |
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per assembly |
| 2 | 8 | 63167001200 | Washer, flat 5/16 I.D. x ¹ / ₂ O.D. x .042 | Steel |
| 3 | 8 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel |
| 4 | 1 | See Fig. 7-11 | Drive Assembly, Hand Op. Double End | Per Assembly |
| 5 | 8 | 63167001300 | Washer, flat, 3/8 I.D. x 9/16 O.D. x .031 | Steel |
| 6 | 8 | Q4650023938 | Screw 3/8-16UNC-2A x 1-3/4, soc. head cap | Steel |
| 7 | 8 | R1065006800 | Washer, flat plain, 3/8 I.D. x 1/16 | Steel |
| 8 | 8 | R1052020300 | Nut, 3/8-16UNC-2B, hex | Steel |
| 9 | 1 | 65010000200 | Base | Steel |
| 10 | 1 | See Fig. 7-9 | Head Assembly, 20,000 psi | Per assembly |
| 11 | 1 | 64042006600 | Tubing, ¼ inch Jumper | 304 St. Steel |

| 46-13411-2, MOTOR-DRIVEN 10,000 PSI SINGLE END | | | | |
|--|------|--|---|--------------|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per assembly |
| 2 | 4 | 63167001200 | Washer, flat 5/16 I.D. x ½ O.D. x .042 | Steel |
| 3 | 4 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel |
| 4 | 1 | See Fig. 7-12 | Drive Assembly, Motor-Driven, Single End | Per assembly |
| 5 | 4 | 63167001300 | Washer, flat 3/8 I.D. x 9/16 O.D. x .031 | Steel |
| 6 | 4 | Q4650023934 | Screw, 3/8-16UNC-2A x 1-1/2, soc. head cap. | Steel |
| 7 | 1 | 63173002000 | Base | Steel |
| 8 | 2 | Q0706012615 | Screw, 10-32UNC-2A x 1-1/2, bind. hd. mach. | Brass N.P. |
| 9 | 1 | 63173010500 | Guard | Steel |
| 10 | 1 | P0552005400 | Motor & Gear Reducer | |
| 11 | 1 | R1065008200 | Washer, flat ½ I.D. | Steel |
| 12 1 Q1850024315 Screw, ¹ / ₂ -13UNC-2A x 3/8, hex head. cap | | Screw, ½-13UNC-2A x 3/8, hex head. cap | Steel | |
| | | 46-13416-2, M | OTOR-DRIVEN 30,000 PSI SINGLE END | • |
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 1 | See Fig. 7-9 | Head Assembly, 30,000 psi | Per assembly |
| 2 | 4 | 63167001200 | Washer, flat 5/16 I.D. x ½ O.D. x .042 | Steel |
| 3 | 4 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel |
| 4 | 1 | See Fig. 7-12 | Drive Assembly, Hand Op. Single End | Per Assembly |
| 5 | 4 | 63167001300 | Washer, flat, 3/8 I.D. x 9/16 O.D. x .031 | Steel |
| 6 | 4 | Q4650023934 | Screw 3/8-16UNC-2A x 1-3/4, soc. head cap | Steel |
| 7 | 1 | 63173002000 | Base | Steel |
| 8 | 2 | Q0706012615 | Screw 3/8-16UNC-2A, bind. Head mach. | Brass N.P. |
| 9 | 1 | 63173010500 | Guard | Steel |
| 10 | 1 | P0552005400 | Motor & Gear Reducer | |
| 11 | 1 | R1065008200 | Washer, flat ½ I.D. | Steel |
| 12 | 1 | Q1850024315 | Screw, ½-13UNC-2A x 3/8, hx head cap | Steel |

| 46-13421-2, MOTOR-DRIVEN 10,000 PSI DOUBLE END | | | | |
|--|------|---------------|---|---------------|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per assembly |
| 2 | 8 | 63167001200 | Washer, flat 5/16 I.D. x ½ O.D. x .042 | Steel |
| 3 | 8 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel |
| 4 | 1 | See Fig. 7-12 | Drive Assembly, Motor-Driven, Single End | Per assembly |
| 5 | 8 | 63167001300 | Washer, flat 3/8 I.D. x 9/16 O.D. x .031 | Steel |
| 6 | 8 | Q4650023934 | Screw, 3/8-16UNC-2A x 1-1/2, soc. head cap. | Steel |
| 7 | 1 | 63173002000 | Base | Steel |
| 8 | 2 | Q0706012615 | Screw, 10-32UNC-2A x 1-1/2, bind. hd. mach. | Brass N.P. |
| 9 | 1 | 63173010500 | Guard | Steel |
| 10 | 1 | P0552005400 | Motor & Gear Reducer | |
| 11 | 1 | R1065008200 | Washer, flat ½ I.D. | Steel |
| 12 | 1 | Q1850024315 | Screw, 1/2-13UNC-2A x 3/8, hex head. Cap | Steel |
| 13 | 4 | 64042001800 | Jumper Tubing | 304 St. Steel |
| 14 | 2 | 45-14311 | Tee, ¼" Tubing | 316 St. Steel |
| 15 | 1 | See Fig. 7-8 | Head Assembly 10,000 psi | Per assembly |

FIGURE 7-7

| 46-13427-2, MOTOR-DRIVEN 30,000 PSI TWO STAGE | | | | | |
|---|------|---------------|---|---------------|--|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL | |
| 1 | 1 | See Fig. 7-8 | Head Assembly, 10,000 psi | Per assembly | |
| 2 | 8 | 63167001200 | Washer, flat 5/16 I.D. x ½ O.D. x .042 | Steel | |
| 3 | 8 | Q4650023530 | Screw, 5/16-18UNC-2A x 1-1/4, soc. head cap | Steel | |
| 4 | 1 | See Fig. 7-12 | Drive Assembly, Motor-Driven, Single End | Per assembly | |
| 5 | 8 | 63167001300 | Washer, flat 3/8 I.D. x 9/16 O.D. x .031 | Steel | |
| 6 | 8 | Q4650023934 | Screw, 3/8-16UNC-2A x 1-1/2, soc. head cap. | Steel | |
| 7 | 1 | 63173002000 | Base | Steel | |
| 8 | 2 | Q0706012615 | Screw, 10-32UNC-2A x 1-1/2, bind. hd. mach. | Brass N.P. | |
| 9 | 1 | 63173010500 | Guard | Steel | |
| 10 | 1 | P0552005400 | Motor & Gear Reducer | | |
| 11 | 1 | R1065008200 | Washer, flat ½ I.D. | Steel | |
| 12 | 1 | Q1850024315 | Screw, ¹ / ₂ -13UNC-2A x 3/8, hex head. Cap | Steel | |
| 13 | 4 | 64042001800 | Jumper Tubing | 304 St. Steel | |
| 14 | 2 | 45-14311 | Tee, ¼" Tubing | 316 St. Steel | |
| 15 | 1 | See Fig. 7-9 | Head Assembly 30,000 psi | Per assembly | |

| TYPICAL HEAD ASSEMBLY 10,000 PSI | | | | |
|----------------------------------|------|-------------|--|----------------|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 8 | P2030074800 | Screw, 5/8-18UNF-2A, Soc. Hd. Cap. | Steel |
| 2 | 8 | P1634041400 | Washer, plain 21/32 I.D. x 1/8 thick | Steel |
| 3 | 1 | 62018001000 | Head Plate | 17-4PH SS |
| 4 | 1 | 62018000500 | Diaphragm | 302 St Stl |
| 5 | 1 | 64042003102 | Body | Chrome-van Stl |
| 6 | 1 | P1604011000 | O-Ring | Buna-N |
| 7 | 1 | P1620009600 | Back-up Ring | Buna-N |
| 8 | 1 | 64042002500 | Packing Retainer | Alum. Bronze |
| 9 | 1 | P1615009000 | Packing | Polyurethane |
| 10 | 1 | 64042002200 | Packing Follower | Alum. Bronze |
| 11 | 1 | 64042002400 | Gland Nut | 416 St. Stl |
| 12 | 1 | 64042002300 | Piston, 9/16" Diameter | 440C St Stl |
| 13 | 1 | P0215025400 | Elbow, 90° Compression type | Brass |
| 14 | 1 | P0215025100 | Elbow, 90° Compression type | Brass |
| 15 | 1 | 62006001201 | Pressure Limiter (See Fig. 7-14N) | Per assembly |
| 16 | 1 | P1245000100 | Tubing ¼" O.D. | Copper |
| 17 | 1 | P1004002900 | Oiler | |
| 18 | 1 | P0204060100 | Tee, 1/4" NPT | Brass |
| 19 | 1 | P0201006100 | Elbow, 45° Street type | Brass |
| 20* | 1 | P0201004100 | Elbow, 90° Street type (Motor Driven Only) | Brass |
| 21 | 1 | 44-14110 | Check Valve, Hydraulic (See Fig. 7-14J) | Per Assembly |
| 22 | 1 | 44-11107 | Check Valve, Discharge (See Fig. 7-14D) | Per Assembly |
| 23 | 1 | 44-11102 | Check Valve, Intake (See Fig. 7-14B) | Per Assembly |

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| TYPICAL HEAD ASSEMBLY 20,000 & 30,000 PSI | | | | |
|---|------|-------------|---|----------------|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 8 | 63034001400 | STUD, ¾-16UNF-2A | Steel |
| 2 | 8 | P1636016400 | Nut, ¾-16UNF-2B, Hex | Steel |
| 3 | 1 | 63034001100 | Washer, flat | Steel |
| 4 | 1 | 63034001100 | Head Plate | 17-4PH SS |
| 5 | 2 | 62018000500 | Diaphragm | 302 St Stl |
| 6 | 1 | P1604022000 | O-Ring | Buna-N |
| 7 | 1 | P1604023900 | O-Ring | Buna-N |
| 8 | 1 | P1604106100 | O-Ring | Buna-N |
| 9 | 1 | P1604109900 | Back-up Ring | Buna-N |
| 10 | 1 | 65013002700 | Packing Retainer | Alum. Bronze |
| 11 | 1 | P1615009100 | Packing | Polyurethan |
| 12 | 1 | 65013002800 | Packing Follower | Alum. Bronze |
| 13 | 1 | 59061000400 | Gland Nut | 416 St Stl |
| 14 | 1 | 59061000200 | Piston, 3/8" diameter | 440C St Stl |
| 15 | 1 | P0215025400 | Elbow, 90° Compression type | Brass |
| 16 | 1 | P0215025100 | Elbow, 90° Compression type | Brass |
| 17 | 1 | 62006001202 | Pressure Limiter (See Fig. 7-14N) | Per assembly |
| 18 | 1 | P1245000100 | Tubing, ¼" O.D. | Copper |
| 19 | 1 | P1004002900 | Oiler | |
| 20* | 1 | P0204060100 | Tee, ¼" O.D. | Brass |
| 21 | 1 | P0201006100 | Elbow, 45° Street type | Brass |
| 22 | 1 | P0201004100 | Elbow, 90° Street type | Brass |
| 23 | 1 | 44-14110 | Check Valve, Hydraulic (See Fig. 7-14J) | Per Assembly |
| 24 | 1 | 44-13120 | Check Valve, Discharge (See Fig. 7-14F) | Per Assembly |
| 25 | 1 | 44-13100 | Check Valve, Intake (See Fig. 7-14E) | Per Assembly |
| 26 | 1 | 64042000402 | Body | Chrome-van Stl |
| 1 | 1 | F | | 1 |

| | DRIVE ASSEMBLY, SINGLE END HAND-OPERATED COMPRESSORS | | | | | | |
|------|--|-------------|---|---------------|--|--|--|
| ITEM | QTY. | PART NO. | DESCRIPTION | MATERIAL | | | |
| NO. | | | | | | | |
| 1 | 1 | 64123000600 | Spacer, Rear | Steel | | | |
| 2 | 3 | P1020021300 | Screw, set 1/2-28 1/4 long | Alloy Steel | | | |
| 3 | 1 | 63173010400 | Link | Steel | | | |
| 4 | 1 | 63167004100 | Screw, shoulder 1/2 x 3 long | Steel | | | |
| 5 | 2 | 63167002500 | Washer, thrust | 416 St. Stl. | | | |
| 6 | 1 | 64123000500 | Spacer, front | Steel | | | |
| 7 | 1 | 63167002100 | Spacer | 316 St. Stl. | | | |
| 8 | 1 | P1620021800 | Retaining Ring | Steel | | | |
| 9 | 1 | 63167004300 | Base Casting | Alum. Alloy | | | |
| 10 | 1 | 63173010300 | Drive Piston | Alloy Steel | | | |
| 11 | 2 | P1500025000 | Bearings | Steel & Nylon | | | |
| 12 | 1 | 63167000800 | Yoke & Bearing Assembly | Alum. Alloy & | | | |
| 13 | 1 | 63167001100 | Handle | Steel | | | |
| 14 | 1 | P1614015400 | Lock Pin | St. Steel | | | |
| 15 | 1 | P2707080400 | Screw, 4-40 UNC-2A x 1/4, fil. Hd. mach. | Steel | | | |
| 16 | 2 | 63167004000 | Screw, shoulder, ¹ / ₂ x 2-1/4 long | Steel | | | |
| 17 | 3 | R1065007200 | Washer, flat 3/8 I.D. | Steel | | | |
| 18 | 3 | R1061005400 | Washer, lock 3/8 I.D. | Steel | | | |
| 19 | 3 | R1052040600 | Nut, hex 3/8-16 | Steel | | | |
| 8 | | 1 | | | | | |

* Item 1 & 6 not used on 10,000 psi models.

| DRIVE A | DRIVE ASSEMBLY, DOUBLE-END & TWO STAGE HAND-OPERATED COMPRESSORS | | | | | |
|----------|--|-------------|---|-------------------------|--|--|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL | | |
| 1 | 3 | P1020021300 | Screw, set 1/2-28 1/4 long | Alloy Steel | | |
| 2 | 1 | 63173010400 | Link | Steel | | |
| 3 | 1 | 63167004100 | Screw, shoulder ½ x 3 long | Steel | | |
| 4 | 1 | 63167002500 | Washer, thrust | 416 St Stl | | |
| 5* | 4 | 64123000500 | Spacer, front | Stee | | |
| 6 | 2 | 63167002100 | Spacer | 316 St Stl | | |
| 7 | 2 | P1620021800 | Retaining Ring | Steel | | |
| 8 | 1 | 63167010000 | Base Casting | Alum. Alloy | | |
| 9 | 1 | 63173010300 | Drive Piston | Alloy Steel | | |
| 10 | 2 | P1500025000 | Bearings | Steel & Nylon | | |
| 11 | 1 | 63167000800 | Yoke & Bearing Assembly | Alum. Alloy & Bronze | | |
| 12 | 1 | 63167001100 | Handle | | | |
| 13 | 1 | P1614016400 | Lock Pin | Steel | | |
| 10 | 1 | | | St Stl | | |
| 14 | 1 | P2707080400 | Screw, 4-40 UNC-2A x 1/4 , fil. Hd. mach. | Stee | | |
| 15 | 2 | 63167004000 | Screw, shoulder, ½ x 2-1/4 long | bitt | | |
| 16 | 3 | R1065007200 | Washer, flat 3/8 I.D. | Steel | | |
| | | B1061005400 | | Steel | | |
| 17 | 3 | R1061005400 | Washer, lock 3/8 I.D. | Steel | | |
| 18 | 3 | R1052040600 | Nut, hex 3/8-16 | Steel | | |
| | | | | | | |

*Item 5 not used on 10,000 psi models.

| DRIVE ASSEMBLY, SINGLE-END MOTOR-DRIVEN COMPRESSORS | | | | |
|---|------|--------------|--|---------------|
| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
| 1 | 3 | P1020021300 | Screw, set 1/4-28 X 1/4 long | Alloy Steel |
| 2 | 1 | 63173010400 | Link | Steel |
| 3 | 1 | 63167004100 | Screw, shoulder ½ x 3 long | Steel |
| 4 | 1 | 63167002500 | Washer, thrust | 416 St Stl |
| 5 | 4 | 63167002100 | Spacer | 316 St. Stl. |
| 6 | 2 | P1620021800 | Retaining Ring | Steel |
| 7 | 2 | 63167004300 | Base Casting | Alum. Alloy |
| 8 | 1 | 63173010300 | Drive Piston | Alloy Steel |
| 9 | 2 | P1500025000 | Bearings | Steel & Nylon |
| 10 | 1 | 63173010100 | Slotted Lever | Steel |
| 11 | 1 | 63173003300 | Adjustable Slide Block | Steel |
| 12 | 3 | R1052030700 | Nut, hex 5/8 – 18UNF-2B | Steel |
| 13 | 3 | R1065008700 | Washer, flat | Steel |
| 14 | 3 | Q18500024846 | Screw, 5/8-18UNF – 2A x 2-1/2 hex. hd. | Steel |
| 15 | 1 | 63173003200 | Crank | Steel |
| 16 | 1 | 01835000500 | Washer, flat | Steel |
| 17 | 1 | 50024009400 | Slide Block | Grey Iron |
| 18 | 1 | 50024008000 | Crank Pin | Steel |
| 19 | 1 | P1602060600 | Grease Fitting | Steel |
| 20 | 3 | R1065007200 | Washer, flat 3/8 I.D. | Steel |
| 21 | 3 | R1061005400 | Washer, lock 3/8 I.D. | Steel |
| 22 | 3 | R1052040600 | Nut, Hex 3/8-16 | Steel |
| 23 | 2 | 63167004000 | Screw, Shoulder ½ x 2 ¼ long | Steel |

| DRI | DRIVE ASSEMBLY, DOUBLE END & TWO STAGE MOTOR DRIVEN COMPRESSORS | | | | | |
|------|---|--------------|---|---------------|--|--|
| ITEM | QTY. | PART NO. | DESCRIPTION | MATERIAL | | |
| NO. | | | | | | |
| 1 | 3 | P1020021300 | Screw, set ¹ / ₄ -28 X ¹ / ₄ long | Alloy Steel | | |
| 2 | 1 | 63173010400 | Link | Steel | | |
| 3 | 1 | 63167004100 | Screw, shoulder 1/2 x 3 long | Steel | | |
| 4 | 2 | 63167002500 | Washer, thrust | 416 St Stl | | |
| 5 | 2 | 63167002100 | Spacer | 316 St. Stl. | | |
| 6 | 2 | P1620021800 | Retaining Ring | Steel | | |
| 7 | 1 | 63167010000 | Base Casting | Alum. Alloy | | |
| 8 | 1 | 63173010300 | Drive Piston | Alloy Steel | | |
| 9 | 2 | P1500025000 | Bearings | Steel & Nylon | | |
| 10 | 1 | 63173010100 | Slotted Lever | Steel | | |
| 11 | 1 | 63173003300 | Adjustable Slide Block | Steel | | |
| 12 | 3 | R1052030700 | Nut, hex 5/8 – 18UNF-2B | Steel | | |
| 13 | 3 | R1065008700 | Washer, flat | Steel | | |
| 14 | 3 | Q18500024846 | Screw, 5/8-18UNF – 2A x 2-1/2 hex. hd. | Steel | | |
| 15 | 1 | 63173003200 | Crank | Steel | | |
| 16 | 2 | 01835000500 | Washer, flat | Steel | | |
| 17 | 1 | 50024009400 | Slide Block | Grey Iron | | |
| 18 | 1 | 50024008000 | Crank Pin | Steel | | |
| 19 | 1 | P1602060600 | Grease Fitting | Steel | | |
| 20 | 3 | R1065007200 | Washer, flat 3/8 I.D. | Steel | | |
| 21 | 3 | R1061005400 | Washer, lock 3/8 I.D. | Steel | | |
| 22 | 3 | R1052040600 | Nut, Hex 3/8-16 | Steel | | |
| 23 | 2 | 63167004000 | Screw, Shoulder ½ x 2 ¼ long | Steel | | |

| CHECK AND RELIEF VALVES | | | | | |
|-------------------------|-------------|--|----------|--|--|
| ITEM | PART NO. | DESCRIPTION | MATERIAL | | |
| NO. | 44.11100 | | | | |
| A | 44-11100 | Check Valve, Intake 10,000 psi Oxygen Service | | | |
| В | 44-11102 | Check Valve, Intake 10,000 psi Gas Service | | | |
| С | 44-11105 | Check Valve, Discharge 10,000 psi Oxygen Service | | | |
| D | 44-11107 | Check Valve, Discharge 10,000 psi Gas Service | | | |
| Е | 44-13100 | Check Valve, Intake 30,000 psi Gas Service | | | |
| F | 44-13120 | Check Valve, Discharge 30,000 Gas Service | | | |
| G | 44-13140 | Check Valve, Intake Double-Ball 30,000 psi Liquid | | | |
| н | 44-13160 | Check Valve, Discharge Double-Ball 30,000 psi Liquid | | | |
| Ι | 44-14100 | Check Valve, Intake Double-Ball 10,000 psi Liquid | | | |
| J | 44-14110 | Check Valve, Oil Intake | | | |
| К | 44-14115 | Check Valve, Discharge Single-Ball 10,000 psi Liquid | | | |
| L | 44-14210 | Check Valve, Intake Double-Ball 10,000 psi Liquid | | | |
| М | 44-14215 | Check Valve Discharge Double-Ball 10,000 psi Liquid | | | |
| N | 62006001201 | Pressure Limiter 5,000 - 14,000 psi | | | |
| | 62006001202 | Pressure Limiter 14,000 – 30,000 psi | | | |
| | 62006001204 | Pressure Limiter 3,000 – 7,500 psi | | | |
| 1 | 63032001000 | Valve Stem Poppet | | | |
| 2 | 62004001000 | Valve Body | 316 SS | | |
| 3 | 45-11316 | Inner Sleeve | 416 SS | | |
| 4 | 45-11313 | Gland Nut | 416 SS | | |
| 5 | 66005000100 | Valve Stem Poppet | | | |
| 6 | 63033000300 | Gasket, Lens Ring | 440 CS | | |
| 7 | 62005000200 | Valve Stem Poppet | 416 SS | | |
| 8 | 62005000400 | Spring | 302 SS | | |

| CHECK AND RELIEF VALVES | | | |
|-------------------------|-------------|---|--------------|
| ITEM | PART NO. | DESCRIPTION | MATERIAL |
| NO. | | | |
| 9 | 66005000300 | Gasket, Lens Ring | |
| 10 | 66004000100 | Valve Stem Poppet | 316 SS |
| 11 | 50029003201 | Spring | 302 SS |
| 12 | 63033000500 | Valve Body | 316 SS |
| 13 | 64037000200 | Valve Body | 316 SS |
| 14 | 63038000400 | Gasket, Lens Ring (2 required on 44-13140, 44-13160, 44- 14210, 44-14215) | 17-4 PH SS |
| 15 | P1500013300 | Ball (2 required on 44-13140, 44-13160, 44-14210, 44- | 440 C SS |
| 16 | | 14215) | |
| 17 | 50029003203 | Spring (2 required on 44-13140, 44-13160, 44-14210, 44- 14215) | 18-8 SS C.D. |
| 18 | 62002000400 | Ball Retainer (2 required on 44-13140, 44-13160, 44-14210, 44-14215) | 304 SS |
| 19 | | | |
| 20 | 62002001000 | Retainer Nut | 316 SS |
| 21 | 62079000400 | Valve Body | 316 SS |
| 22 | 62002001100 | Valve Body | 316 SS |
| 23 | 62006000800 | Screw, Socket Head Set, 24 UNF-2A, 5/16" | Steel |
| 24 | 64079000300 | Spring Guide | 416 SS |
| 25 | P1632014900 | Spring | Alloy Steel |
| 26 | 64079000200 | Stem | 440C SS |
| 27 | 62006000900 | Valve Body | C.R.S. |
| | 62006001100 | Gland Nut | C.R.S. |
| 28 | 62006001001 | Orifice, 0.093 Dia., 5000 – 14,000 psi (Used on 10,000 psi | 17-4 PH SS |
| | OR | | |
| | 62006001002 | Orifice, 0.062 Dia., 14,000 0 30,000 psi (Used on 20,000 and 30,000 psi Head) | 17-4 PH SS |
| | P1054005500 | Stop Nut, 24 UNF-2B, 5/16" | Steel |